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| EXAMINER |
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GUPTA, ANISH

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| ART UNIT | PAPER NUMBER |
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1654

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08/22/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/669,597

**Applicant(s)**

MARTINEZ ET AL.

**Examiner**

Anish Gupta

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-38 and 59-108 is/are pending in the application.
- 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-11, 13-15, 17-27, 30, 35, 38, 59-67, 69-71, 73-82, 85, 90, 93-96 and 101-108 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

Continuation of Disposition of Claims: Claims withdrawn from consideration are 12,16,28,29,31-34,36,37,68,72,83,84,86-89,91 and 92, 97-100.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election of Group I, with the species of GM-CSF, dihydroxy poly(ethylene glycol) in the reply filed on March 7, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Applicants state that claims 1-11, 13-15, 17-27, 30, 35, 38, 59-67, 69-71, 73-82, 85, 90, 93-96, 101-108 read on the elected species. Claims 12, 16, 28, 29, 31-34, 36, 37, 68, 72, 83, 84, 86-89, 91 and 92, 97-100 are withdrawn from consideration as corresponding to non elected species. To further prosecution, the search was extended to a pegylated species of TNF with EG-  $\alpha,\beta$ -bis-vinyl sulfone.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-11, 13-15, 17-27, 30, 35, 38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "[a] conjugate comprising one or more bioactive components" and "polyalkylene glycol is attached to a single bioactive component at a single site on the polyalkylene glycol." It is unclear how more than one bioactive components can be present in the conjugate when the claim recites that the PEG is attached to a single bioactive component.

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### Written Description

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 1-11, 13-15, 17-27, 30, 35, 38, 59-67, 69-71, 73-82, 85, 90, 93-96, 101-108 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The MPEP states that the purpose of the written description requirement is to ensure that the inventor had possession, as of the filing date of the application, of the specific subject matter later claimed by him. The courts have stated:

"To fulfill the written description requirement, a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude that "the inventor invented the claimed invention." Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (1997); In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) (" [T]he description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). Thus, an applicant complies with the written description requirement "by describing the invention, with all its claimed limitations, not that which makes it obvious," and by using "such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention." Lockwood, 107 F.3d at 1572, 41 USPQ2d at 1966." Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

The MPEP lists factors that can be used to determine if sufficient evidence of possession has been furnished in the disclosure of the Application. These include "level of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with a known or disclosed correlation between structure and function, and the method of making the claimed invention. Disclosure of any combination of such identifying characteristics that

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distinguish the claimed invention from other materials and would lead one of skill in the art to the conclusion that the applicant was in possession of the claimed species is sufficient.” MPEP 2163.

Further, for a broad generic claim, the specification must provide adequate written description to identify the genus of the claim. In Regents of the University of California v. Eli Lilly & Co., the court stated:

“A written description of an invention involving a chemical genus, like a description of a chemical species, ‘requires a precise definition, such as by structure, formula, [or] chemical name,’ of the claimed subject matter sufficient to distinguish it from other materials. Fiers, 984 F.2d at 1171, 25 USPQ2d at 1606; In re Smythe, 480 F.2d 1376, 1383, 178 USPQ 279, 284-85 (CCPA 1973) (“In other cases, particularly but not necessarily, chemical cases, where there is unpredictability in performance of certain species or subcombinations other than those specifically enumerated, one skilled in the art may be found not to have been placed in possession of a genus. . . .”). Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

The MPEP further states that if a biomolecule is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is “not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence.” MPEP 2163. The MPEP does state that for generic claim the genus can be adequately described if the disclosure presents a sufficient number of representative species that encompass the genus. MPEP 2163. If the genus has a substantial variance, the disclosure must describe a sufficient variety of species to reflect the variation within that genus. See MPEP 2163. Although the MPEP does not define what constitute a sufficient number of representative, the Courts have indicated what do not constitute a representative number species to adequately describe a broad generic. In Gostelli, the Court determined that the disclosure of two chemical compounds within a subgenus did not describe that subgenus. In re Gostelli, 872 F.2d at 1012, 10 USPQ2d at 1618.

In the instant case, the claims are drawn to conjugates comprising one or more bioactive component covalently attached to a linear or branched polyalkylene glycol. The base claim does not

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define the bioactive agent and subsequent dependent claims 27-31, while claiming specific biological agents, also claims mimic or functional agonist of any of the specific peptides/proteins claimed. The generic statement of biologically active agent or mimic of functional antagonist, does not provide ample written description for the compounds since the claims do not describe a single structural feature. The specification does provide examples of what qualify as compounds of the claimed invention. The specification describes, specifically, non-peptide agents such as, daunorubicin, doxorubicin, p-aminoaniline mustard, melphalan, cytosine arabinoside ("Ara-C") and other anti-metabolic compounds, e.g., gemcitabine, amphotericin B and peptides such as hemoglobin, Factors VII, VIII, and IX, immunoglobulins, insulin, IL-1 through IL-18, interferons, colony stimulating factors including without limitation GM-CSF, G-CSF, macrophage colony stimulating factor, thrombopoietin, megakaryocyte growth and development factor, erythropoietin, platelet derived growth factor, phospholipase-activating protein ("PLAP"), leukemia inhibitory factor ("LIF," also known in the art as "Steel Factor"), neurotrophic factors, insulin, lectins and ricins, tumor necrosis factors and related proteins, TGF-alpha or TGF-beta, fibroblast growth factors, epidermal growth factors, hepatocyte growth factors, hormones, somatomedins, erythropoietin, prolactin, chorionic gonadotropin, follicle-stimulating hormone, thyroid-stimulating hormone, prolactin, tissue plasminogen activator (see page 28 of the specification). The MPEP states that written description for a genus can be achieved by a representative number of species within a broad generic. However, the specific peptide/non-peptide bioactive agents do not provide written description for all of the bioactive agents, mimetic, and functional antagonist of the claimed invention. The possible structural variations are limitless to any class of bioactive compound. The specification does not provide description for bioactive agents that include different types of heterocycles, PNA molecule with divergent DNA sequences, etc... The specification does not disclose a single mimetic of any of the peptides/non-peptide molecules disclosed, nor does the specification provide any specific illustrations of functional antagonist. It must not be forgotten

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that the MPEP states that if a biomolecule is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is "not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence." MPEP 2163. Here, though the claims may recite some functional characteristics, the claims lack written description because there is no disclosure of a correlation between function and structure of the compounds beyond compounds disclosed in the examples in the specification. Moreover, the specification lack sufficient variety of species to reflect this variance in the genus. The specification is limited to the above mention cyclic molecules that share a common core. There is no disclosure of a polymer with hydrogen bonding sites and capable of promoting release of the active compounds does not provides sufficient structural characteristics. The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention. See In re Wilder, 736 F.2d 1516, 1521, 222 USPQ 369, 372-73 (Fed. Cir. 1984) (affirming rejection because the specification does "little more than outlin[e] goals appellants hope the claimed invention achieves and the problems the invention will hopefully ameliorate."). Accordingly, it is deemed that the specification fails to provide adequate written description for the genus of the claims and does not reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the entire scope of the claimed invention.

### **Enablement**

4. Claim 1-11, 13-15, 17-27, 30, 35, 38, 59-67, 69-71, 73-82, 85, 90, 93-96, 101-108 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to



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enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The factors to be considered in determining whether a disclosure meets the enablement requirement of 35 U.S.C. 112, first paragraph, have been described in *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988). Among these factors are: (1) the nature of the invention; (2) the state of the prior art; (3) the relative skill of those in the art; (4) the predictability or unpredictability of the art; (5) the breadth of the claims; (6) the amount of direction or guidance presented; (7) the presence or absence of working examples; and (8) the quantity of experimentation necessary. When the above factors are weighed, it is the examiner's position that one skilled in the art could not practice the invention without undue experimentation.

(1) the nature of the invention

The invention is drawn to methods for preparing conjugate that have reduced anigenicity and immunogenicity compared to similar conjugates prepared using PEG containing methoxyl or another alkoxy group.

(2) the state of the prior art

The art states that one of the hydroxyl groups of the PEG is converted to mono-functional methoxy-PEG since high diol concentration will yield unwanted cross-linking conjugates (see page 406 of Veronese). Monofunctionality of methoxyPEG makes it particularly suitable for protein and peptide modification because it yields reactive PEGs that do not produce crosslinked polypeptides, as long as diol PEG has been removed (see page 462 of Roberts). Roberts states that a promising strategy for generating heterobifunctional PEGs and using them in polymerization. The art has

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recognized PEG groups with a hydroxyl group at one terminus and amino group at the other end or PEG groups with formyl group on one end and hydroxyl group at the other end. However, Roberts states that "This strategy also has its limits. Only those anions that are desirable as end groups and suitable for initiating polymerization are useful for synthesis of heterobifunctional PEG by this route. This method is also limited by the fact that rigorous exclusion of water is necessary to prevent the formation of the diol. This problem becomes more severe as the PEG molecular weight increase." (See page 472-473).

(3) the relative skill of those in the art;

The skill in the art is high.

(4) the predictability or unpredictability of the art

Given the state of the art with respect diol and crosslinking, it is highly unpredictable to form a PEG conjugate with one biological agent.

(5) the breadth of the claims

The claims are drawn to a product where the conjugate comprises one or more bioactive components covalently attached to a polyalkylene glycol, wherein the glycol does not comprise an alkoxy group. Applicants elected the bioactive component as GM-CSF and the polyalkylene glycol as dihydroxy PEG. Claim 59 require the product to be obtained by using modifying one end of the glycol with a "derivatizing group" and the other end being a hydroxyl group. Thus, a PEG with a free hydroxyl end is utilized in the formation of the conjugation.

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(6) the amount of direction or guidance presented and (7) the presence or absence of working examples

The specification provides for general conditions on how to conjugate PEG to a bioactive agent. The specification states that the bioactive agent can be reacted with dihydroxyPEG in an "aqueous reaction medium that can be buffered, depending on the pH requirements of the nucleophile and the activated polymer. . . The optimal reaction condition necessary to maintain the stability of the bioactive component, the reaction efficiency, etc., are within the level of the ordinary skill in the art." The specification also provide working examples that that test for antibodies to monomethoxyPEG and examples that illustrate antibodies with PEGs lacking methoxyl groups. Other working example illustrate the synthesis of the  $\alpha$ -hydroxy- $\beta$  monnitrophenyl carbonate PEG and  $\alpha$ -hydroxy- $\beta$  monopropionaldehyde PEG. The specification, however, does not provide any examples that demonstrate the coupling of a hetrobifunctional PEG, with a free hydroxyl group, to a protein, especially GM-CSF. Such guidance is necessary because the art indicates that the strategy utilizing hetrobifuncatioal PEG, that have a free hydroxyl group, also has its limits. Only those anions that are desirable as end groups and suitable for initiating polymerization are useful for synthesis of heterobifunctional PEG by this route. This method is also limited by the fact that rigorous exclusion of water is necessary to prevent the formation of the diol. This problem becomes more sever as the PEG molecular weight increase. Further, the art recognizes that when PEG-diol is present, unwanted crosslinking occurs. The specification does not provide guidance as to how to exclude water to prevent the formation of diol. Note that the claims require that the PAG is attached to a single bioactive component at a single site on the PEG. This claim language seemingly excludes crosslinked proteins. However, without protection of the free hydroxyl or how to prevent formation of diol, a crosslinked product would occur.

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(8) the quantity of experimentation necessary.

Given the problems associated with conjugation of PEG-diols to bioactive agents, one would be burdened with undue experimentation to make the claimed invention.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-11, 13-15, 17-27, 30, 35, 38, 94-95 are rejected under 35 U.S.C. 102(b) as being anticipated by Kohno et al.

The claims are drawn to a product where the conjugate comprises one or more bioactive components covalently attached to a polyalkylene glycol, wherein the glycol does not comprise an alkoxy group.

The reference disclose conjugation of PEG of 20 Kda with TNF (see page 43). The reference states that TNF was pegylated by PEG-  $\alpha,\beta$ -bis-vinyl sulfone. The conjugates isolated from the column included monosubstituted pegylated TNF. Since the reference disclose monosubstituted, and since the starting material was PEG-  $\alpha,\beta$ -bis-vinyl sulfone, the non-conjugated end of the PEG molecule would not contain an alkoxy or aryloxy. Furthermore, the reference states that the PEG-  $\alpha,\beta$ -bis-vinyl sulfone was generated using PEG diol (see page 42). This meets the limitation of the reactive derivative of claims 5 and 6.

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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anish Gupta whose telephone number is (571)272-0965. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cecilia Tsang, can normally be reached on (571) 272-0562. The fax phone number of this group is (571)-273-8300.



Anish Gupta  
Patent Examiner